

CHILDREN'S TOOTH AND GUM CLEANING KIT

CROSS-REFERENCE TO RELATED APPLICATIONS

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BACKGROUND OF THE INVENTION

001 It is common for caregivers of infants and small children to assume that the proper care of primary teeth is less important than the care of adult teeth because the baby teeth will eventually be replaced as the child grows older. However, it has become known to the dental industry in recent years, that the proper care and health of the baby teeth is critical to the health and alignment of the adult teeth when they grow in.

002 It is now understood that the proper care and cleaning of an infant's gums and the proper care and cleaning of a child's primary teeth can increase the health and esthetics of the adult teeth when they grow in as well as save the caregiver potentially hundreds or even thousands of dollars in dental work and orthodontic care.

003 Many different toothbrush shapes and styles for infants and children are known in the prior art. Many of these designs are aimed at meeting a specific need of a specific age group of child.

004 From the perspective of the caregiver, the disadvantage of the prior art inventions are that they require the often uneducated caregiver to determine and locate and purchase the type of toothbrush which is appropriate for each stage of the child's development.

005 From the perspective of the infant or child, the prior art inventions do not provide a logical or easy transition from one stage to the next, which may cause the child to resist such a dramatic change.

006 In summary, it is the overall objective of this invention to meet the changing oral hygiene needs of a growing child with a series of tooth and gum cleaning devices which exhibit a dramatic change between the first stage and the last, but with stages of incremental change in between which are subtle enough so the child will welcome the change at each stage rather than resist it.

SUMMARY OF THE INVENTION

007 These and other aspects of the invention are set out in the claims, which are incorporated here by reference.

008 Change can be a difficult process for young children, which in turn, makes change for the child a difficult process for the caregiver. It is, therefore, one objective of the present invention to provide a cohesive progression of various sizes and shapes and styles of tooth and gum cleaning devices which are ideally suited to each stage of a child's physical and psychological development, and which maintain elements of familiarity to the child from stage to stage to make the progression less dramatic and less stressful to the child and to the caregiver.

009 It is another objective of the present invention to provide a tooth and gum cleaning kit for infants and children which starts with cleaning tips which are ideally suited for infants and progresses in stages which are specifically designed for each level of a child's physical and psychological development until the child is old enough to make proper use of a more conventional toothbrush.

010 It is a further objective of the present invention to reward the child with a feeling that they are "growing up" as they progress from stage to stage.

011 It is a further objective of the present invention to provide a progression of shapes and styles of tooth and gum cleaning tips and handles which will aid the caregiver and the child in developing healthy habits of oral hygiene.

012 It is a further objective of the individual components of this invention to enable the best possible oral hygiene for the infant or child with consideration given to reducing the time and effort required by the caregiver as well as taking into consideration the limited attention span and the limited motor skills of the child at different stages of the child's physical and psychological development.

013 It is a further objective of the present invention to provide a complete kit which will allow the caregiver to benefit from the knowledge and experience of dental care professionals in determining the different needs of different ages of infants and children and thereby save the caregiver time and money by providing them with a simple and straightforward progression of tips and handles for each stage of a child's physical and psychological development from infancy to the age when a child is able to make proper use of a more conventional toothbrush.

014 It is a further objective of the present invention to reduce the size and cost of such a kit by making it modular in construction with a universal handle that can hold and secure a number of different tips.

015 It is a further objective of this invention to provide a series of tooth and gum cleaning tips and handles which are attractive as well as functional and safe to use.

016 It is further objective of the present invention to apply several of the unique concepts which have been developed for the Children's Tooth and Gum Cleaning Kit and apply them to unique designs for tooth and gum care products for older children and adults.

017 It is a further objective of the present invention to provide tips which comfortably and effectively and automatically clean the inner cheek area, the roof of the mouth and the tongue during tooth and gum cleaning by using an omni-directional bristle tip which is generally oval or elliptical or oblong in shape when viewed from the top.

018 It is a further objective of the present invention to provide practical methods of manufacturing some of the components of this invention.

BRIEF DESCRIPTION OF THE FIGURES

019 Preferred embodiments of the invention will now be described with reference to the figures, in which like reference characters denote like elements, by way of example, and in which:

FIG. 1 is a perspective top view of the Children's Tooth and Gum Cleaning Kit storage case;

FIG. 2 is a perspective top view of the Children's Tooth and Gum Cleaning Kit storage case with the lid open;

FIG. 3 is a perspective top view of the Children's Tooth and Gum Cleaning Kit contents without the storage case;

FIG. 4 is a perspective side view of the stage one "finger tip" for infants ages 0-1 years.

FIG. 5 is a perspective bottom view of the stage one "finger tip" for infants ages 0-1 years.

FIG. 6 is a perspective partial side view of the drying pegs in the side of the storage case.

FIG. 7 is a perspective side view of the stage two "clip tip" for children ages 1-2 years.

FIG. 8 is a perspective bottom view of the stage two "clip tip" for children ages 1-2 years.

FIG. 9 is a sectional perspective view of the stage two “clip tip” for children ages 1-2 years.

FIG. 10 is a front view of the preferred handle with the stage two “clip tip”.

FIG. 11 is a side view of the preferred handle with the stage two “clip tip”.

FIG. 12 is a section view of the preferred handle with the stage two “clip tip” attached.

FIG. 13 is a section view of the preferred handle in the locked position.

FIG. 14 is a section view of the preferred handle in the unlocked position.

FIG. 15 is a perspective front view of the preferred handle with the stage two “clip tip”.

FIG. 16 is a side view of the stage three “clip tip” for children ages 2-3 years.

FIG. 17 is a front view of the stage three “clip tip” for children ages 2-3 years.

FIG. 18 is a top view of the stage three “clip tip” for children ages 2-3 years.

FIG. 19 is a side view of the stage four “clip tip” for children ages 3-4 years.

FIG. 20 is a front view of the stage four “clip tip” for children ages 3-4 years.

FIG. 21 is a top view of the stage four “clip tip” for children ages 3-4 years.

FIG. 22 is a schematic top view of a round inner surface shape with a non-round outer surface shape.

FIG. 23 is a schematic top view of a non-round inner surface shape with a round outer surface shape.

FIG. 24 is a schematic top view of a non-round inner surface shape with a non-round outer surface shape.

FIG. 25 is a schematic top view of a different non-round inner surface shape with a non-round outer surface shape.

FIG. 26 is a schematic side view of a cylindrical inner surface shape with a tapered outer surface shape.

FIG. 27 is a schematic side view of a tapered inner surface shape with a cylindrical outer surface shape.

FIG. 28 is a schematic side view of a tapered inner surface shape with a tapered outer surface shape.

FIG. 29 is a perspective side view of a tapered-ridge stage three tip.

FIG. 30 is a perspective side view of a tapered-bristle stage four tip.

FIG. 31 is a perspective side view of longitudinal-ridge tip.

FIG. 32 is a perspective side view of a helical-ridge tip.

FIG. 33 is a perspective bottom view of four tip stages for infants and children from ages 0-4 years.

FIG. 34 is a perspective side view of four tip stages for infants and children from ages 0-4 years.

FIG. 35 is a perspective sectional side view of the stage two “swivel tip”.

FIG. 36 is a perspective partial side view of the “swivel tip” alternate handle showing a detail of the securing means.

FIG. 37 is a perspective front view of the “swivel tip” handle embodiment and securing means with the tip before insertion.

FIG. 38 is a perspective front view of the “swivel tip” handle embodiment and securing means with the tip inserted and swiveled into final position.

FIG. 39 is a top view section of the “swivel tip” alternate handle with the tip inserted showing a detail of the securing means.

FIG. 40 is a perspective top view of a cost effective “disposable” handle with a stage two tip.

FIG. 41 is a perspective top view of the same cost effective “disposable” handle with a stage three tip.

FIG. 42 is a perspective front view of the same cost effective “disposable” handle with a stage four tip.

FIG. 43 is a sectional side view of the same cost effective “disposable” handle showing the safety air passage.

FIG. 44 is a perspective front view of an alternative low cost shape for the stage one or two tip.

FIG. 45 is a perspective front view of an alternative low cost shape for the stage two tip.

FIG. 46 is a perspective front view of an alternative low cost shape for the stage three tip.

FIG. 47 is a front view of the omni-bristle tooth brush for older children and adults.

FIG. 48 is a side view of the omni-bristle tooth brush for older children and adults.

FIG. 49 is a perspective side view of the omni-bristle tooth brush for older children and adults.

FIG. 50 is a front view of the helix tip omni-bristle tooth brush for older children and adults.

FIG. 51 is a side view of the helix tip omni-bristle tooth brush for older children and adults.

FIG. 52 is a perspective close-up partial side view of the helix tip omni-bristle tooth brush for older children and adults.

FIG. 53 is a perspective view of step one of the elliptical tip manufacturing method.

FIG. 54 is a perspective view of step two of the elliptical tip manufacturing method.

FIG. 55 is a perspective view of step three of the elliptical tip manufacturing method.

FIG. 56 is a simplified perspective view of step four of the elliptical tip manufacturing method.

FIG. 57 is a close-up simplified front view of step two of the manufacturing method for triangular shaped final parts.

FIG. 58 is a close-up simplified front view of step four of the manufacturing method for triangular shaped final parts.

FIG. 59 is a simplified sectional front view of the omni-bristle electric toothbrush for older children and adults.

FIG. 60 is a close-up simplified sectional partial front view of the omni-bristle electric toothbrush for older children and adults.

FIG. 61 is a close-up simplified sectional top view of the omni-bristle electric toothbrush for older children and adults.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

020 The indefinite article “a” before a claim feature does not exclude more than one of the feature being present.

021 Immaterial modifications may be made to the embodiments of the invention described here without departing from the invention.

022 The preferred embodiments of the present invention will now be described in detail.

023 The storage case 1 is shown in FIG. 1. It is preferably constructed of injection molded plastic and of a color similar to or complementing the color of the contents. The cover 2 is preferably of a translucent injection molded plastic so the contents of the kit are somewhat visible while the cover is closed. The circle-line pattern 3 on the cover 2 is preferably a consistent feature of this line of products.

024 FIG. 2 shows the storage case 1 with the cover 2 in the open position. The contents of the kit are held in molded cavities 4 and include a universal toothbrush handle 5, a tube of edible toothpaste 6, a row 7 of “finger tips” 8 for infants ages zero to one years old, a row 9 of “clip tips” 10 for ages one to two years old, a row 11 of “clip tips” 12 for ages two to three years, a row 13 of “clip tips” 14 for ages three to four years, a mini CD 15 with computer instructions, and a laminated instruction card 16 which is shown in FIG. 3. Each row of tips is labeled with raised numbers and letters 17 on the storage case 1 according to the age they are intended for.

025 The contents of the kit are shown in FIG. 3 without the case. The smaller size of the smaller tips 8, 10 allow more of these tips to fit in the same space as the larger tips 12, 14. The recommended life of the tips will most likely require refills to be purchased. The kit is designed with this in mind so that rows of refill tips can be molded or secured in a temporary holder so they could be easily placed into the appropriate rows of cavities 4 in the storage case 1 as a set.

026 FIGS 4 through 17 will discuss the function and construction of the different tips in more detail.

027 FIG. 4 and 5 show the “finger tip” 8 for infants. The foam cleaning member 18 of the tip 8 is a flexible foam material. Important characteristics of the type of foam are tear resistance, tasteless, and attractive color. An example of the type of foam that would be suitable is currently used for pen and pencil comfort grips and sold at many stores in North America.

028 The foam cleaning member 18 is molded or bonded to a flexible sleeve 19. The sleeve is constructed with an integrated finger loop 20 to be secured around a finger or fingers of the caregiver. The material for the sleeve 19 should also be flexible, tasteless, tear resistant and attractively colored. Alternatively, if a strong enough foam is used, the safety finger loop 20 may be molded as one piece from the same material as the foam cleaning member 18.

029 The shape of all the foam tips in the Children’s Tooth and Gum Cleaning Kit are generally elliptical or oval or an oblong shape 21 when viewed from the bottom as seen in FIG. 5 to allow easy insertion into the infant or child’s mouth and to achieve effective cleaning of the surface of the tongue and the roof of the mouth as well as the inside of the cheeks (which is called the “vestibule”) with a 90 degree twist of the finger or the handle. The tips are also generally tapered 22 toward the top end to increase the comfort and ease of inserting the tip into the infant or child’s mouth. “Top” in this patent being defined as the end which is closest to the user during brushing and/or the end which is vertically upright when the handle is free standing on its base 35 (see FIG. 10)

030 Referring back to FIG. 5, to use the “finger tip” 8, the caregiver places their finger (preferably their “pinky” finger) into the sleeve 19 and places the loop 20 around the adjacent finger or fingers as a safety feature to keep the tip 8 secure. A small amount of edible cleaning gel 6 is then applied to the tip 8 which is then placed gently into the infant’s mouth.

031 The baby’s natural reflex at this age is to suck on anything placed in its mouth. This will allow the cleaning member 18 of the tip 8 to clean the tongue and roof of the infant’s

mouth at the same time. To complete the cleaning procedure, the caregiver sweeps the tip 8 from side to side over the top and bottom of the gums so that the insides of the cheeks are also cleaned. This whole procedure will only take a short time and should preferably be done after the infant has been fed to help to prevent “milk mouth” and other oral hygiene related problems. After the cleaning procedure is complete, the tip 8 is rinsed, squeezed to remove excess water and placed on a drying peg 23 shown in FIG. 6 to dry. The foam tips may also be soaked in water and frozen and used to sooth the gums of the infant during the teething process. All of the foam tips of the present invention may be washed with soap and hot water periodically, but are designed to be replaced after a certain period of time or a certain number of uses which will best be determined through testing and experimentation and recommended by the manufacturer.

032 The first “clip tip” 10 is shown in FIGURES 7 through 9. Elements of familiarity with the previous tip 8 include a similar elliptical or oval or oblong shape 21 as the “finger tip” 8 when viewed from the top and a similar tapered shape toward the top end 22 to aid in the smooth transition from the stage one tip 8. The cleaning member 24 is also made of a similar foam material of the cleaning member 18 of the “finger tip” 8.

033 The stage two tip 10 is designed for children ages one to two years. Elements of progression from the previous tip 8 may include a slight increase in size in consideration of the growing child. More noticeably, the stage two tip 10 attaches to the universal handle 5 to begin to prepare the child to use a more conventional adult toothbrush when they are older.

034 Each of the “clip tips” from stage two through four have a similar internal construction as the stage two tip 10 shown in FIG. 9. The foam cleaning member 24 is molded or bonded to the more rigid sleeve member 25 which is designed with an inwardly protruding securing means 26 which clips into the tip locking mechanism 42 of the universal handle 5 as illustrated in FIG. 13. Many different securing means are anticipated by the inventor. A safety feature of the present invention of this preferred embodiment is shown in FIG 9 where the foam cleaning member 24 is molded around the sleeve member 25 to produce a dependable mechanical retention 27 of the foam member 24 instead of relying on an adhesive

bond between the two members. Another safety feature of the present invention is the air passage 28 at the top end of each of the “clip tips”. The purpose of this hole 28 is to prevent suffocation of the child if the handle 5 is accidentally pushed too far into the child’s mouth by the child or the caregiver, or if one of the tips 10, 12, 14 were to become accidentally detached from the handle 5.

035 In stage two, the caregiver will begin to train the child to manage a toothbrush with a handle and to begin the process of teaching the child to clean their own teeth. The universal handle 5 is shown in detail in FIGURES 10 through 15. The unique shape of the hand held portion 29 of the handle 5 is designed to “grow” with the child by virtue of the hand held portion of the handle 29 being smaller in diameter in the middle 30 where the child will first hold it when they are in stage one, and it becomes increasingly larger 31, 32 toward each distal end to become progressively larger as the child’s hand grows in stages three and four. In addition, the handle is large enough at both distal ends 33, 34 for the caregiver to comfortably and practically hold the handle with their hand over top of the child’s hand during the beginning of each stage when the caregiver is teaching the child how to use each new tip.

036 Furthermore, the handle 5 is wide enough at the base 35 to stand on it’s own to allow the tips to dry after use. The circle-line pattern 36 provides a functional grip surface and is specifically designed as one piece on each handle half 37, 38 in FIG. 11 to be injection molded of a resilient material into the rigid handle members 37, 38 in FIG. 11 using a “double shot” molding process. The handle is preferably molded of a colored translucent material to add interest to the design and to be complementary with the storage case. The handle is generally wider when viewed from the front than it is when viewed from the side and has an elliptical or oval or oblong shape 39 (FIG. 15) when viewed from the top or bottom to provide a comfortable and convenient grip as well as to visually compliment the shape of the tips.

037 The mechanical construction of the handle 5 is shown in FIGURES 12 through 14. FIG. 12 shows one of the two halves 38 of the handle which snapped together with the other half along the male and female protrusion and slots 40, 41 and mechanically secure the tip

locking mechanism 42 between the two halves 37, 38. In the preferred embodiment, each of the two handle halves has a male protruding ridge 40 on one side and a female receiving slot or shoulder 41 on the other side. In this way, the production cost of the parts can be reduced by making both halves 37, 38 identical. A bonding agent may also be used to secure and possibly to seal the assembly. The tip locking mechanism 42 is held open by the transverse hollow cam follower 43 at the top end of the rod 44 which extends along the center axis of the handle 5 from the base 35 of the handle 5 where it is secured inside the “bubble button” 45. The “bubble button” 45 is a semi-flexible injection molded part with a bellows 46 construction which allows it to flex primarily in the axial direction. The button 45 is flexible enough to be depressed by the adult caregiver with their thumb as they hold the flared distal end 33 of the handle 5 between their first and second finger like a syringe. The button 45 is preferably too stiff to be depressed by a child and must have enough elastic force in the deformed position to cause the cam follower 43 to expand the tip locking mechanism 42 into the locked position. The “bubble button” 45 is located at the bottom of the handle 5 as prevention measure against accidental depression by the child or caregiver during use.

038 FIGURES 13 and 14 show the handle 5 in the locked and unlocked positions. When the button 41 in FIG. 14 is depressed, the rod 44 is moved axially toward the tip locking mechanism 42 where it moves through the seal 47 and causes the cam follower 43 to slide along the expanding cam slot 48 allowing the two halves of the tip locking mechanism 42 to move radially together and release the inwardly protruding securing means 26 (shown in FIG. 12) of the clip tip 10 which protrude into the tip locking slot 49 of the tip locking mechanism 42. The tip locking mechanism 42 is molded as one piece in the retracted position shown in FIG. 14 so that it must be elastically deformed while in the locked position in FIG. 13. The tip locking mechanism is a rigid plastic material which is designed to deform elastically in the area near the base 50 where the transverse generally round through-hole 51 reduces the cross section of the material to create a “living hinge” in this area. This allows the cam follower 43 to activate the locking and unlocking function from the inside of the tip locking mechanism 42 where it is compact and protected. The cam follower 43 in this preferred embodiment is hollow for esthetic reasons to compliment the other round features of the design. An actual hinge or pivot on one half of the tip locking mechanism 42 could also be used in place of the

reduced cross section area 50 but would likely be more complicated and costly. Lateral retaining guide flanges 52 (shown in figure 13) prevent the cam follower from dislodging sideways.

039 The reliefs 53 shown in figure 10 are designed for tooth clearance during cleaning, but if the elastic preload of the tip locking mechanism 42 is not sufficient to bring the two halves together when in the unlocked position, these slots 53 or similar slots could be used to retain an extensible o-ring made of urethane or other resilient material which could be used as an additional spring load to bring the two halves of the tip securing member 42 together to allow easy removal of the clip tips 10, 12, 14.

040 The tip locking mechanism is also designed to maintain an unrestricted air passage which is similar in total cross section to the air passage 28 in the top end of the clip tips so the child will still be able to breath if the handle is accidentally pushed too far into his or her mouth by themselves or by the caregiver.

041 In another variation of the preferred embodiment, the handle could be filled with balls or bells or rattles to add additional interest to the infant or child. A removable plug could be designed into the handle so these objects could be removed at some point as another positive reinforcement of the child "growing up".

042 In another variation of the preferred embodiment, the handle could be filled with a fluid or combination of fluids that turn different colors or change phase or appearance after prolonged and/or rigorous agitation during brushing to give the child a visual goal and/or reward for how long and how thoroughly they have brushed. This feedback to the user could also be electronically controlled but it is preferred by the inventor to use a non-electronic indicator such as a foaming colored fluid or two different non-emulsifying fluids such as one color of oil or silicone fluid and a different color of water or other non-emulsifying fluid which could mix together with a small amount of air and/or with one or more agitator objects such as one or more plastic spheres or one or more small teddy bear shapes etc.. The two or more dissimilar non-emulsifying fluids are preferably of a low enough viscosity to mix together during thorough tooth and gum cleaning and to separate while the toothbrush is

sitting for several hours between uses, but high enough in viscosity to remain in a mixed state for at least several minutes after use. This will create a colorful and interesting mixture when the toothbrush is used thoroughly enough and/or long enough which will encourage and reward the child and which will give the caregiver an indication of how thoroughly and how long the child has brushed.

043 Other variations of the preferred embodiment of the invention include a portable travel case with storage cavities for the universal handle, a regular size or reduced size tube of cleaning gel, one or more extra tips, and at least one drying peg. The drying peg and the case being preferably constructed so a stage one tip can be placed on a drying peg to dry inside the case where it is protected and kept clean while the case is closed. stage two, three, and four tips could dry on the handle. The portable travel case would be constructed with air vents so all wet components will dry when the case is closed. In another variation, an even more portable travel case for stage one only, would have storage cavities for one or more stage one finger tips, a tube or container of cleaning gel, and one or more drying pegs with air vents so the tips can dry while the travel case is closed.

044 The function of the “clip tips” for stages two through four will now be discussed.

A perspective view of the universal handle 5 with the stage two tip 10 is shown in FIG. 15. Due to the age and limited motor skills of the child in at this age, the cleaning procedure in stage two is similar to the cleaning procedure in stage one. The child holds the toothbrush but the caregiver applies the tooth cleaning gel 6 to the tip 10 and guides the child’s hand to place the tip 10 in the child’s mouth.

045 The child sucks down on the tip, just as he or she did in stage one, to clean their tongue and the roof of their mouth and then, with the help of the caregiver sweeps the tip 10 from side to side over the bottom and top of their teeth. The caregiver guides the child’s hand to rinse the toothbrush under running water, squeeze excess water out by hand, and stand the handle 5 on its base 35 to allow the tip to dry. This procedure will take only a short time in consideration of the child’s limited attention span, and at the same time will reward the child with the feeling of using a more adult style toothbrush and brushing their own teeth

055 In stage two, there is very little change in the shape of the tip from stage one so it will still be familiar to the child even though there is a significant change in the procedure and the securing means for the tip. In stage two, the child will begin, in a gradual way, which is appropriate to the child's motor skills and attention span, to learn to clean his or her teeth for him or herself and to begin to develop the "healthy habit" of cleaning their entire mouth on a regular basis.

056 Elements of familiarity from stage one to stage two include the foam material and the basic shape. Elements of progression include the use of the universal handle and may also include a slight increase in size and a slight change in color.

057 The stage three tip 12 is shown in FIGURES 16 through 18. The elements of familiarity for stage three include the same internal sleeve 25 and the same safety air passage 28 (shown in FIG. 18) as the stage two tip 10 and the same universal handle, the same foam material 53 the generally elliptical or oval or oblong shape when viewed from the top, which is indicated by the narrower side view in FIG. 16, the wider front view in FIG. 17 and the elliptical top view in FIG. 18, as well as the generally tapered shape 55 toward the top end 56 of the tip 12.

058 It should be noted that a slight progression in the color of the foam from stage to stage is considered by the inventor to be a positive progression to reinforce the "growing up" reward, for the child. Ideally, the preferred embodiment would use a progression of colors or shades or hues of color which do not change drastically from stage to stage such as from lighter to darker.

059 The elements of progression of the stage three tip 12 from the stage two tip 10 include a slight increase in the overall size and raised ridges or rings 54 which are one step closer to an actual toothbrush and will clean both front and back of the front teeth while preparing the child for the next step. The raised rings or ridges shown in FIGURES 16 and 17 are in the 2-6 mm range radially in consideration of the size of teeth of children this age. The raised rings or ridges 54 may be greater or shallower in depth, greater or fewer in number, and thicker or

thinner in thickness than the rings or ridges 54 illustrated here and still be within the scope of the present invention.

060 The ridges or rings 54 have a specific purpose to clean the inside and outside of the child's front teeth when they bite down on the tip. This is important because the average child's natural hand movement at this age is not a front and back reciprocating motion along the longitudinal axis of the toothbrush as an adult would move, but rather a rotating of their wrist from side to side around their wrist axis generally parallel to the center axis of the toothbrush handle, or a circular motion of their hand and forearm generally on a plane perpendicular to the center axis of the toothbrush handle. The average child at this age will also be able to randomly move their hand from side to side at the same time, thus cleaning the inner and outer surfaces of their front teeth by virtue of the raised foam rings or ridges 54 instead of by the skill of the child. Closing their mouth on the stage three tip 16 should be a habitual action by this time and will clean their tongue and the roof of their mouth simultaneously. The instructional card and CD will also teach the caregiver to clean the outside of the back teeth which, by virtue of the omni directional cleaning surface of all of the tips 8, 10, 12, 14 in the kit, will clean the outside of the back teeth and the inside of the cheek simultaneously.

061 As with stage two, once the cleaning procedure is complete, the tip 12 is rinsed under running water, squeezed out by hand and the handle 5 is placed upright so the tip can dry.

062 It should be noted that although it may be possible for a skilled adult to achieve more effective cleaning of the child's teeth with a more conventional unidirectional bristle toothbrush, it is considered by the inventor to be significantly more practical and less time consuming for the child and the caregiver to use the present invention. Considering the human factors of the time and patience of the caregiver and the attention span and motor skill of the child, it is believed by the inventor that the present invention will provide significantly better overall oral hygiene in the long term than the use of a unidirectional bristle toothbrush in the hands of a child or in the hands of a caregiver as they try to clean the teeth of a potentially uncooperative child.

063 A side view of the stage four tip 14 is shown in FIG. 19. The elements of familiarity of the stage four tip 14 with the stage three tip 12 include the universal handle 5, the sleeve member 60, the foam material 57, the air vent 28, the generally tapered shape 58 toward the top end 59, and the generally elliptical or oval or oblong shape when viewed from the top or bottom as shown in the narrower side view in FIG. 19, the wider front view in FIG. 20 and the top view in FIG. 21.

064 The elements of progression from the stage three tip 12 to the stage four tip 14 may include a slight increase in size and a slight change in the color but most noticeably, the stage four tip 14 is constructed with foam “bristles” 63 which will complete the preparation of the child for the transition to a more conventional toothbrush. The bristles 63 may be larger or smaller or longer or shorter or greater in number or fewer in number than the bristles 63 illustrated here and still be within the scope of the present invention. The diameter of the foam bristles 63 of the preferred embodiment are in the 2-6 mm range and the length of the bristles is in the 2-12 mm range.

065 The foam bristles 63 reward the child for “growing up” to a stage which is more like an adult toothbrush, but it does not require them to have the skill of an adult to achieve effective cleaning. Any random movement of the brush by the child will provide cleaning of the teeth as well as the inside of the mouth.

066 It should be noted that with tip stages three and four, the outer shape 61 in FIG. 21 can be generally elliptical or oval or an oblong shape when viewed from the top, with the inner shape 62 being generally round when viewed from the top. Or the inner shape 62 can be elliptical or oval or an oblong shape when viewed from the top or bottom, with the outer shape 61 being generally round when viewed from the top. Or both the inner shape 62 and the outer shape 61 can be elliptical or oval or an oblong shape when viewed from the top. The inner shape 62 and the outer shape 61 may both be generally round when viewed from the top with one or both of these being completely or partially tapered toward the top end 59.

067 FIGURES 22 through 25 show different schematic combinations of simplified inner and outer, round and non-round shapes of the present invention when viewed from the top.

FIGURES 26 through 28 show different combinations of simplified inner and outer, cylindrical and non-cylindrical shapes of the present invention when viewed from the front or side. It should be noted that top-view shapes can be combined with front-view shapes.

068 Other combinations anticipated by the inventor include shapes that are tapered or non-round for only a portion of their length or simple shapes with only an outer surface such as the stage one and two tips 8, 10 which could use any of the FIGURES 22 through 28 outer shapes 61 on their own or in combination for their full length or a portion of their length.

069 It should also be noted that the simple shapes of the stages one and two tips 8, 10 and/or the rings or ridges 54 of the stage three tip 12 and/or the foam bristles 63 of stage four tip 14 could be used in various combinations on the same tip for various cleaning effects and/or to create stages with more elements of familiarity with the previous or subsequent stage. Foam rings or ridges 54 can also be tapered or pointed as shown in FIG. 29 and the foam bristles 63 can also be tapered or pointed as shown in FIG. 30. The ridges 54 can also run parallel to the longitudinal axis of the tip as shown in FIG. 31, or the ridges or bristles can run at an angle as is shown in FIG. 32. Many other combinations of shapes and patterns are anticipated by the inventor to be within the scope of this patent including happy faces and other shapes that would be interesting to a child.

070 FIGURES 33 and 34 illustrate the progression in size and shape of the four tips as well as the elements of familiarity.

071 All of these tips can be used with an edible cleaning gel 6 such is commonly available for infants and young children.

072 FIGURES 35 through 39 show an alternative "swivel tip" embodiment with a potentially more cost effective replaceable tip system. The hand held portion of the handle 29 is substantially the same shape and configuration as the handle 5 of the first embodiment without the flexible tip locking mechanism and actuation means. The "swivel tip" 64 in FIG. 35 has an integral foam cleaning member 65 and rigid supporting member 66 with perpendicularly opposed securing protrusions 67, 68 and a safety air passage 69. The

protrusions 67, 68 slide and lock into the channels 70, 71 in the swivel tip securing means 72. In FIG. 37 the “swivel tip” 64 is inserted into the securing means 72. The lower perpendicularly opposed securing protrusion 67 is guided into position by the channel 70 which is only wide enough for the protrusion 67 to slide into position if the “swivel tip” 64 is held at a significant angle to the tip securing means 72. The channel 70 only opens on one side of the securing means 72 and allows the protrusion 67 to act as a stop against the far inside wall of the circular through-hole 73 (best seen in FIG. 36) to prevent further movement of the swivel tip 64 along its longitudinal axis but still allowing it to swivel into the final position with the longitudinal axis of the swivel tip 64 aligned with the longitudinal axis of the tip securing means 72. FIG. 38 shows the “swivel tip” 64 snapped into the final position. The upper protrusion 68 has tapered edges 74 which cause the two halves of the securing means 72 to deform elastically apart when the tip 64 is swiveled into position. Once the tip is near the upright position in FIG 38, the circular through-hole 75 allows the two halves of the securing means 72 to return to a less deformed position which secures the “swivel tip” 64 rigid supporting member 66 in the upright position which is most clearly seen in FIG 39. The upper channel 71 can be seen in FIGURES 36 and 39 to be narrower than the lower channel 70 and more importantly, narrower than the upper protruding member 68 so the two halves of the tip securing means 72 must be elastically deformed to “snap” the tip 64 into the secured position, and to “unsnap” the tip 64 when it needs to be replaced.

073 Many different configurations of this embodiment are obviously possible. This present embodiment was chosen by the inventor for functional, manufacturing, and esthetic reasons.

074 FIGURES 40 through 43 show a disposable handle and tip embodiment of the present invention. With this embodiment, many of the benefits of the first embodiment can be realized without purchasing the entire kit or the more expensive universal handle 5 at the same time. The foam tips 77, 78, 79 in this embodiment are of similar shape and dimensions to the foam tips 10, 12, 14 of the first embodiment but are molded or bonded permanently to the handles. The handle 80 is of a one piece construction and injection molded of an inexpensive plastic. The stratified design 81 and vertical cross beam internal member 82

provide a strong but lightweight part with a similar attractive shape and similar function to the first embodiment handle 5 but at a much lower production cost. FIG. 43 is a sectional view which shows the air passage 83 and horizontal air vents 84 which can be molded into the handle 80 with the addition of only one “pull” in the injection mold.

075 FIGURES 44 through 46 show a progression of potentially lower cost head shapes which could be used with any of the different handle embodiments described in this patent. Instead of molding the foam parts to a finished shape, the parts are molded to a larger shape and then shaved down to the final shape with a cutting tool. FIG. 44 shows this production method as applied to a stage one or stage two shaped tip 85. FIG. 45 shows this production method as applied to a stage three tip 86. FIG. 46 shows this production method as applied to a stage four tip 87. The square shape of the foam bristles 88 results from the intersection of the vertical cut lines 89 and horizontal cut lines 90 of the cutting wheel or bit or blade.

076 The stage one and two shaped tip 85 and the stage three tip 86 could be machined with this method to look more like the tips of the first embodiment of the stage three tip 12 with rounded corners, but it is more consistent with the cohesive nature of this embodiment of the present invention if the tip shapes 85 and 86 have characteristic square edge shape 91, 92 similar to the square corners and edges of the stage four tip 93.

077 FIGURES 47 and 48 show a front and side view of an “omni-bristle” toothbrush which uses more conventional bristles but is still cohesive with the Children’s Tooth and Gum Cleaning Kit. This tooth brush 93 is designed for adults and older children and takes advantage of a slenderized and elongated version of the flared oval, elliptical or oblong, when viewed from the top handle shape 94 (most clearly seen in FIG. 49) as well as the esthetically attractive and functional double shot molded circle–line grip pattern 95. The toothbrush 93 may also be self standing. The advantages of this design include reduced requirement of hand-eye coordination and reduced requirement of concentration, as well as more effective cleaning of all mouth surfaces including the inner cheek, the tongue and the roof of the mouth. Other handle shapes can be used and still be within the scope of the present invention. The bristles 96 could be of a more conventional plastic filament design or a semi flexible foam design.

The outer shape of the bristles 97 can be elliptical or oval or an oblong shape when viewed from the top, with the inner shape of the rigid head member 98 being generally round or cylindrical when viewed from the top. Or the inner shape 98 can be elliptical or oval or an oblong shape when viewed from the top or bottom, with the outer shape 97 being generally round or cylindrical when viewed from the top. Or both the inner shape 98 and the outer shape 97 can be elliptical or oval or an oblong shape when viewed from the top. The rigid head shape 98 and/or the outer bristle shape 97 are also preferably tapered toward the top end 99. The inner rigid member 98 and the outer bristle shape 97 may both be generally round when viewed from the top with one or both of these being completely or partially tapered toward the top end 99.

078 FIGURES 50 and 51 show another embodiment of the omni-bristle toothbrush for older children and adults with a helical tip 100. The helical tip 100 has a practical function as well as an esthetic appeal. The practical function is based on the flexibility of the coiled head which makes the head of the toothbrush somewhat conformable to the inside of the mouth. A close-up of the helical tip design is shown in FIG. 52 which is believed by the inventor to be unique and esthetically appealing. Apart from the helical shape of the rigid or semi-rigid inner member 100, the inner member and the outer shape 101 of the bristles may be of any round or non-round shape when viewed from the top and any cylindrical or non-cylindrical shape when viewed from the front or side.

079 FIGURES 53 through 56 show a simplified conceptual manufacturing method for the non round foam tips of the present invention. A round part can be more easily and inexpensively machined than a non-round part because a round part can be turned on a lathe at high speed. The manufacturing method of the present invention allows non-round cross-section parts of flexible material, such as foam, to be turned quickly and inexpensively on a lathe or similar rotating machine. FIG. 53 shows a round blank 102 of foam, or other flexible material before it is deformably secured onto the non-round mandrel 103. FIG. 54 shows the foam blank 102 in a deformed shape before machining. FIG. 55 shows the mandrel 103 spinning around a longitudinal axis 106, and the cutting tool 104 removing material 105 to give the deformed part 102 a round cross-section. FIG. 56 shows the foam part 102 removed

from the mandrel 103 and returned to its non-deformed shape which is now non-round. This manufacturing method can be applied to foam blanks or other deformable materials with a round or non-round center hole. FIGURES 57 and 58 show how this manufacturing method can be used to produce various final shapes such as triangular by using various mandrel shapes. FIG. 57 shows the deformed foam part 107 on a triangular mandrel 108 before machining. The circular dashed line 109 represents the deformed shape of the part 107 after machining. FIG. 58 shows the machined part shape 110 after machining and removal from the mandrel 108. It should be noted that a part with a non round center hole could be machined to a non-round final shape by deformably securing it onto a round mandrel for machining. It should also be noted that the outer shape can also be non-round before machining. It should also be noted that non-cylindrical final shapes can be achieved by using a tapered or partially tapered mandrel or by changing the radial distance of the cutter from the rotational axis of the mandrel as the cutter moves axially. It should also be noted that the mandrel may be designed with a cross-sectional shape that varies along its length to achieve various final part shapes.

080 This manufacturing method has application to many other products such as foam grips for writing instruments, hand tools, kitchen utensils and many other applications and products.

081 The electrically powered embodiment of the omni-bristle toothbrush for older children and adults is described schematically in FIGURES 59 through 61. With an omni-bristle electric toothbrush configuration of the present invention, the tip 111 could rotate around the longitudinal axis 112 of the handle 113 at a variable or constant or intermittent speed in either direction. This direction could be set by a reversing switch controlled by the user or the tip 111 could switch directions automatically, with the direction to be determined by a rotational/axial acceleration sensor in the form of an “inertia wheel” assembly 114 which would signal an electronic control unit 112 as to which way the user is rotationally accelerating the toothbrush 113 around the longitudinal axis of the handle 115. The electronic control unit 115 then rotates the tip 111 via the electric motor and gear reducer 116 which spins the drive shaft 117 which is rotationally positioned by bearings 118, 119 around the longitudinal axis of the handle 112 in the same direction as the direction initiated by the user

(or possibly the opposite direction, but it would be more intuitive to rotate the toothbrush in the same direction as the twisting motion of the user). For this embodiment, a rotational angle between 5 and 20 degrees would be adequate for sensing purposes but greater or lesser angles may work also.

082 To use this embodiment, the tip 111 would be placed, for example, inside the mouth on the outside of the top row of teeth. A twisting motion around the center axis of the toothbrush 112 by the user which rotates the bristles 120 down away from the gums would initiate the spinning of the tip 111 in that same direction, causing the bristles 120 to brush away from the gums. When the user places the tip 111 against the outside of the bottom row of teeth, for example, and twists the handle in the opposite direction, the head reverses direction and brushes away from the gums again.

083 To clean the chewing surface of the teeth with the present invention, the user could initiate a reciprocating motion along the longitudinal axis 112 of the toothbrush handle 113 much like a conventional tooth brushing motion. This axial acceleration would be sensed by the inertia wheel assembly 114 which would signal the electronic control unit 112 which would initiate a different spinning pattern such as a continuously high frequency reversing motion of between a fraction of a degree and 180 degrees or more. Alternatively, it could also respond to an axial acceleration of the handle by initiating a high frequency reciprocating motion of the drive shaft 117 and tip 111 by means of a linear excitation mechanism integrated into the motor and gear reducer assembly 116.

084 A close-up view of the rotational/axial inertia wheel assembly 114 of the preferred embodiment is shown in FIG 60. The inertia wheel 121 is mounted to a metallic shaft 122 and is rotationally positioned in low friction bearings 123, 124 which allow the inertia wheel 121 to rotate about the center axis of the shaft 122 as well as to slide axially. The bearings 123, 124 are also metallic and are used as electrical contacts to complete a circuit which will include at least one of the bearings 123, 124, the shaft 122, the contact arm 125, one of the rotational motion contacts 126, 127 and/or the axial motion contact 128. A combination coil/compression spring 129, 130 on either side of the wheel 121 elastically positions the

wheel rotationally and axially. The two springs 129, 130 are identical (not symmetrical) so they can both be preloaded and still keep the wheel centered. When the user rotates the toothbrush handle 113 in one direction 133, the inertia of the wheel 121 will cause it to resist rotation and essentially to rotate in the opposite direction 135 relative to the toothbrush handle 113. The wheel 121, shaft 122, and contact arm 125 act as one unit and must be reasonably balanced rotationally so the toothbrush can be held in any position and still respond consistently to rotational accelerations applied by the user. When a rotational acceleration of greater than a predetermined rate is caused by the user, the contact arm 125 will contact one of the rotational motion contacts 126, 127 which will send a signal to the electronic control unit 112 which will initiate a predetermined output to the drive shaft 117.

085 When an axial acceleration of greater than a predetermined rate is caused by the user, the end of the shaft 122 will contact the axial motion contact 128 which will send a signal to the electronic control unit 112 which will initiate a predetermined output. This inertia wheel assembly should be designed with a strong enough compression spring to prevent the shaft 122 from contacting the axial motion contact 128 when the toothbrush is in any position except during axial accelerations.

086 Some sort of mechanical damping and/or electronic control philosophy (such as a delay of a fraction of a second or more than a second) must be designed into the system to prevent the controller 112 from responding to axial or rotational decelerations or axial or rotational rebound accelerations which will often happen shortly after the first axial or rotational user initiated acceleration.

087 Some experimentation will likely be required to determine the most appropriate combination of spring 129, 130 rates and inertia wheel 121 mass to be easily activated by the user but not over sensitive so unwanted activation can be avoided.

088 Another variation of this embodiment is shown in FIG. 61. In this embodiment, the tip 111 would rotate away from the gums for a number of degrees 131 (such as approximately 60 degrees) or a certain period of time, and then counter-rotate the tip 111 for a lesser number of degrees 132 (such as approximately 15 degrees) or a shorter period of time, to simulate the

action of using a non-powered toothbrush to work the bristle tips below the gum line and then brush away from the gums as some dentists recommend to clean the teeth.

089 By combining a high frequency reciprocating motion and/or high frequency reversing rotating action to the rotationally biased staggered rotation motion described herein, the action of cleaning all surfaces of the teeth and working the bristle tips into the gum line could be accomplished very effectively with very little effort or concentration required by the user. The direction of the rotational bias and or the high frequency reciprocating motion and/or high frequency reversing rotation would be set by the user with a simple and intuitive action of rotational twisting 133 the handle 113 and/or axially moving 134 the handle 113 in a conventional “brushing” motion.

090 The inventor believes that there may be an additional psychological benefit of this powered toothbrush embodiment for older children and adults as the control philosophy will interact with the user and make tooth and gum cleaning more interesting. In a more advanced embodiment of the powered toothbrush invention, the acceleration sensors could sense various levels of rotational and axial acceleration and the controller could respond with proportional output levels of speed and/or frequency and/or rotational angle and/or any number of variables which could be determined to be appropriate and beneficial through experimentation and testing.

091 One example of a proportional control philosophy would increase the speed of the directionally biased rotation with increased rotational acceleration of the user, and would increase the frequency of the high frequency reversing rotation or reciprocating motion with increased axial input accelerations by the user. In this example, the more rigorously the user brushes, the faster the toothbrush tip 111 will rotate or reciprocate to assist them.

092 It is anticipated by the inventor that the same inertia input activated control concept may have many applications in industrial and other applications including but not limited to deburring tools, cleaning brushes, powered screw drivers and hand drills.

093 It is also anticipated by the inventor that the sensing mechanism could be made much smaller, but has been enlarged here for clarity. Also, miniature accelerometers have recently become available on microchips and could be used instead of the inertia wheel design.

094 It is also anticipated by the inventor that there are many other types of powered motion which could be used in conjunction with the omni-bristle toothbrush head.

095 All of the possible embodiments could be plugged into a power source with a cord or could be powered by replaceable or rechargeable batteries.